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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO.              |
|---|-------------|----------------------|---------------------|-------------------------------|
| 10/643,934  | 08/20/2003  | Woo-Shik Lee         | 6192.0307.US        | 5383                          |
| 7590  | 04/19/2005  |                      |                     |                               |
| McGuire Woods<br>Suite 1800<br>1750 Tysons Boulevard<br>McLean, VA 22102-4215 |             |                      |                     | EXAMINER<br>DUONG, THOI V     |
|   |             |                      |                     | ART UNIT<br>2871 PAPER NUMBER |

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/643,934             | LEE ET AL.          |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Thoi V. Duong          | 2871                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 14 January 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-52 is/are pending in the application.  
 4a) Of the above claim(s) 27-52 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-9, 11-22 and 24-26 is/are rejected.  
 7) Claim(s) 10 and 23 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election with traverse of Group I, claims 1-26, in the reply filed on 01/14/2005 is acknowledged. The traversal is on the ground(s) that the subject matter of all claims is sufficiently related that a thorough search for the subject matter of any one Group of claims would encompass a search for the subject matter of the remaining claims. This is not found persuasive because Group I, claims 1-26, and Group II, claims 27-52 are related as process of making and product made. The inventions are distinct since the liquid crystal display apparatus can be made by a different process in which the liquid crystal material is disposed by injection instead of dropping.

Because these inventions are distinct and the search required for Group I is not required for Group II, the requirement is still deemed proper and is therefore made FINAL.

Accordingly, claims 27-52 are withdrawn and claims 1-26 are considered in this office action.

***Claim Objections***

2. Claim 16 is objected to because of the following informalities: claim 16 recites the limitation "the substrate" in line 1. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.
3. Claim 17 is objected to because of the following informalities: claim 17 recites the limitation "the transparent substrate" in line 2. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

4. Claim 19 is objected to because of the following informalities: claim 19 recites the limitation "the transparent substrate" in line 2. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

5. Claims 9 and 22 are objected to because of the following informalities: claims 9 and 22 recite the limitation "the amount of compression of the spacer" in line 2. There is insufficient antecedent basis for this limitation in the claims. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 1, 4-8, 11-14, 17-21 and 24-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishiyama et al. (Nishiyama, USPN 6,507,385 B1).

Re claims 1 and 14, as shown in Fig. 6(a) below, Nishiyama discloses a liquid crystal display apparatus comprising:

a first substrate 2 including a display region for displaying an image;

a second substrate 1 facing the first substrate 2;

a fence 7 disposed between the first substrate and the second substrate, the fence surrounding the display region to form a space defined by the first and second substrates and the fence;

a liquid crystal layer 4 disposed in the space; and

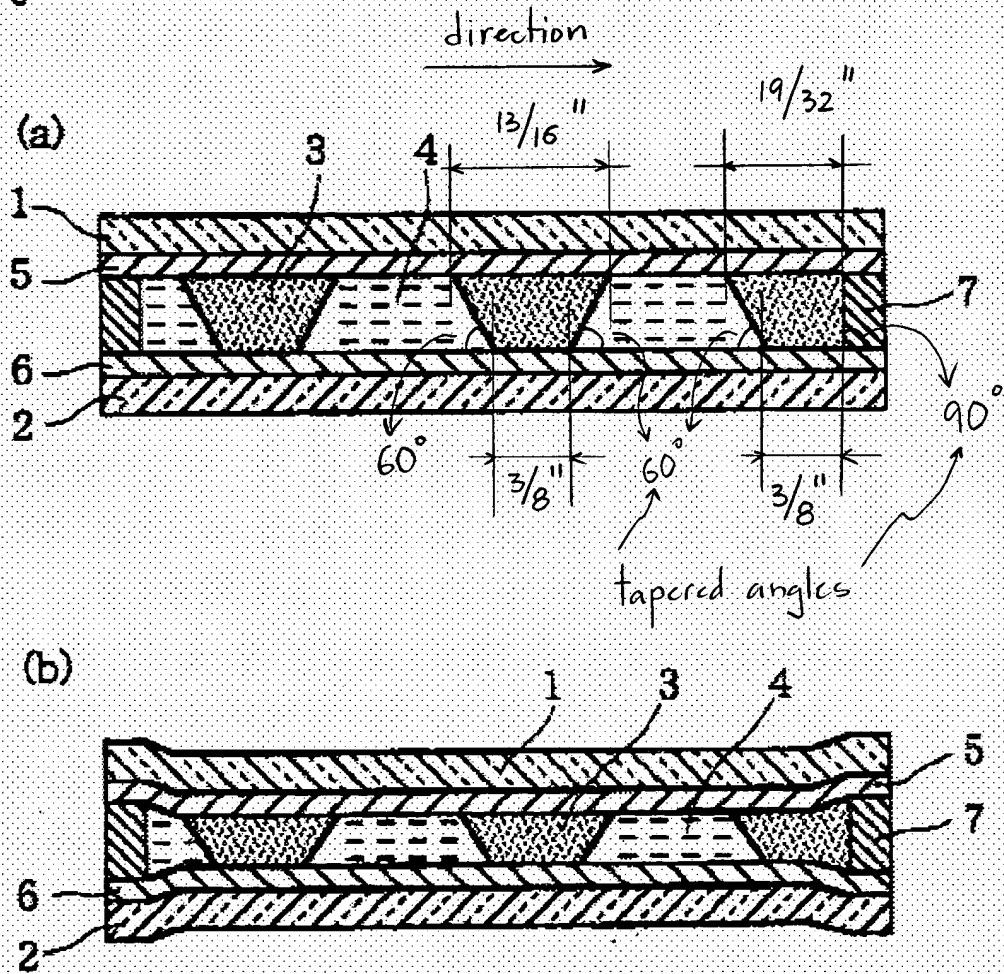
a plurality of spacers 3 disposed in the space, the spacers maintaining the distance between the first and second substrates, the spacers having a gradually increasing compression ratio in a direction from a center of the display region to an edge of the display region,

wherein, re claims 4 and 17, the spacers 3 are tapered, a side face of the spacer and the first substrate forming a tapered angle, the tapered angle of the spacers gradually increasing in the direction, a product of an upper diameter and a lower diameter of the spacers decreasing in the direction;

wherein, re claims 5 and 18, a difference of the tapered angle of the spacer disposed at the edge, which is 90 degrees and the tapered angle of the spacer disposed at the center, which is about 60 degrees, is no more than about 40 degrees; and

wherein, re claims 6 and 19, the spacers are tapered, such that a tapered angle is constant, a side face of the spacer and the second substrate 1 forming the tapered angle, a diameter of the spacers decreasing in said direction (Fig. 6(a)).

Fig. 6



Re claims 7, 8, 20 and 21, it is inherent that a polymer linking density of the spacers and Young's modulus of the spacers decrease in the direction due to reduction of cross-section areas of the spacers in the direction as shown in Fig. 6(a).

Re claims 11 and 24, as shown in Fig. 3, the spacer 3 disposed at the center has a column shape, the spacers being tapered in the direction, wherein, re claims 12 and 25, the column has a cylindrical shape, a rectangular prism shape or a hexagonal prism shape; and

wherein, re claims 13 and 26, the column is tapered to form a truncated cone shape, a frustum of rectangular pyramid shape or a frustum of hexagonal pyramid shape (col. 10, lines 17-27).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2, 3, 9, 15, 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. (Nishiyama, USPN 6,507,385 B1) in view of Kajita et al. (Kajita, USPN 6,275,280 B1).

Re claim 2, 3, 15 and 16, Nishiyama discloses a liquid crystal display device that is basically the same as that recited in claims 2, 3, 15 and 16 except for the spacers being formed such that the spacers deviate from the pixel electrodes and are disposed over the black matrix.

Re claims 2 and 15, as shown in Fig. 1 and 6-8, Kajita discloses a liquid crystal display device comprising a plurality of pixel electrodes 10 formed on a substrate 13, wherein spacers 24 are formed such that the spacers deviate from the pixel electrodes 10.

Re claims 3 and 16, as shown in Fig. 17, Kajita discloses a liquid crystal display device comprises a black matrix 2 and a common electrode 6 formed on a substrate 1, wherein spacers 24 are formed such that the spacers are disposed over the black matrix 2.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the liquid crystal display device of Nishiyama with the teaching of Kajita by forming the spacers such that the spacers deviate from the pixel electrodes and are disposed over the black matrix to lower the influence of the reflected light and enhance the display quality (col. 14, lines 7-13).

Re claims 9 and 22, as shown in Fig. 6(b), Nishiyama discloses an amount of compression of the spacer disposed at the center being smaller than an amount of compression of the spacer disposed at the edge. However, Nishiyama does not discloses the different amount of about 0.1 micrometer between the compression of the spacer disposed at the center and the compression of the spacer disposed at the edge.

As shown in Fig. 2, Kajita discloses that the load compression displacement of the spacers is preferably from 0.01 to 0.1 micrometer/mN (col. 4, lines 10-25) so that the display quality is not reduced when subjected to a force or impact from outside (col. 2, lines 10-16).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the liquid crystal display device of Nishiyama with the teaching of Kajita to have an amount of compression of the spacer disposed at the center being smaller than an amount of compression of the spacer disposed at the edge by about 0.1 micrometer so as to maintain a uniform gap (col. 2, lines 10-16).

***Allowable Subject Matter***

10. Claims 10 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: none of the prior art of record fairly suggests or shows all of the limitations as claimed.

Specifically, none of the prior art of record discloses, in combination with other limitations as claimed, the spacers being formed, such that a condition  $1 < A_{center} / A_{edge} < 1 + 0.1A_{center}$  is satisfied, where  $A_{center}$  is a cross-sectional area of the spacer disposed at the center and  $A_{edge}$  is a cross-sectional area of the spacer disposed at the edge.

The most relevant reference, USPN 6,507,385 B1 of Nishiyama et al. (Nishiyama), fails to disclose the above condition. As shown in Fig. 6(a), the Nishiyama's reference discloses:

$A_{center} = .2217$ , where diameter of cross-section at center is 17/32 inch

$A_{edge} = .1726$ , where diameter of cross-section at edge is 15/32 inch

Accordingly,

Acenter/Aedge = 1.2845

1 + 0.1Acenter = 1.0222.

Thus, Nishiyama fails to satisfy Acenter/Aedge < 1 + 0.1Acenter.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong

04/15/2005



TARIFUR R. CHOWDHURY  
PRIMARY EXAMINER